Patent Application

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Request for Examination: Demand.

Purport

We file an application under Article 42 of Patent Act, file a Request for Examination under Article 60 of the same Act. Agent Jang-Won Park (Signature)

Official Fee

Application Fee	11 page(s) 29,000 won.
Additional Application Fee	0 page(s) 0 won.
Priority Fee	0 case 0 won.
Examination Fee	2 claims 173,000 won.
Total	202,000 won.

Attached Documents

1. 1 summary · specification(drawing).

Patent Specification

Abstract

Abstract

The present invention has the effect that at the same time, isolating area between elements are defined through the photo lithography for the gate forming and the changing of characteristic factor of device and processing simplification is minimized through the manufacturing method of the semiconductor device consisting of the process of injecting the impurity ion for the threshold voltage control, the process it successively forms the gate oxidation film and polysilicon after removing the buffer oxide layer, and coating the poly silicon upper part with the first photoresist, and of exposing and developing and taking shape the first photoresist pattern so that the polysilicon of the domain, the process applying the first photoresist pattern and etching polysilicon and gate oxidation film, and of removing the first photoresist pattern after it etches excessively in order to be the and then exposed semiconductor substrate etched to the predetermined depth and forming the shallow trench, the process it performs the field oxide after performing the high voltage source / drain ion injection to the exposed domain of the semiconductor substrate, and the process coating with the second photosensitive film on outcome, and etching the polysilicon after forming the buffer oxide layer on the semiconductor substrate upper into the thing about the manufacturing method of the semiconductor device. In that way the characteristic of being stable of device can be secured. As to the process it successively forms the gate oxidation film and polysilicon after, isolating area between elements are formed be exposed. As to the process it performs the field oxide after, the shallow trench as described above is formed and of forming the field oxide film. The process coating with the second photosensitive film on outcome, and etching the polysilicon is exposed after it exposes and it develops and it takes shape the second photosensitive pattern so that the gate forming area polysilicon be exposed and forming the gate, and of removing the second photosensitive pattern.

Representative Drawing

Drawing 2f

Specification

Title of Invention

FABRICATING METHOD OF SEMICONDUCTOR DEVICE{FABRICATING METHOD OF SEMICONDUCTOR DEVICE}

Brief Description of the Drawings

Figs. 1a through 1f are the procedure side view showing the manufacturing method of the conventional semiconductor device.

Figs. 2a through 2f are the procedure side view showing the embodiment of the present invention.

The description *** of the symbol about the main part of *** drawing.

11: semiconductor substrate 12: buffer oxide layer.

13: gate oxidation film 14: polysilicon.

15: field oxide film PR11,PR12: photosensitive film.

The Detailed Description of Invention

The Purpose of Invention

Field of Invention and the Prior Art

The present invention relates to the manufacturing method of the semiconductor device, particularly, to the manufacturing method of the appropriate the semiconductor device characteristic is stabilized with simplifying the formation of the isolated gate (gate isolation) high voltage transistor.

As described in detail, it is the same as that of the next time with reference to the procedure side view of the figs. 1a through 1f attaching the manufacturing method of the conventional insulation gate high voltage transistor.

Firstly, as shown in Figure 1a, after successively forming the oxide film (2) and nitride film (3) on the semiconductor substrate (1) in which the N-well / P-well (non illustration) is formed through the process of being normal, the photosensitive film (PR1) is coated with at the upper part of the nitride film (3). The photosensitive film (PR1) pattern is taken shape so that it expose and it develops and the isolating area between elements be exposed.

And as shown in Figure 1b, after etching the nitride film (3) selectively exposed by the photosensitive film (PR1) pattern, the high voltage source/drain (high voltage source drain : HSD) ion implantation is performed.

And as shown in Figure 1c, after removing the photosensitive film (PR1) pattern, the field oxide is performed and the field oxide film (4) is formed on the domain in which the high voltage source / drain ion injection is performed.

And as shown in Figure 1d, after after removing the nitride film (3), the oxidation being enforced and forming the buffer oxide layer (5) on the upper front surface, the impurity ion for the threshold voltage control is injected on the semiconductor substrate (1) in which the field oxide film (4) is not formed.

And as shown in Figure 1e, the photosensitive film (PR2) is coated with at the upper part of the polysilicon (6) after depositing the polysilicon (6) on outcome. It exposes and it develops and the photosensitive film (PR2) pattern is taken shape so that the gate forming area the polysilicon (6) be exposed.

And as shown in Figure 1f, after the polysilicon (6) selectively exposed by the photosensitive film (PR2) pattern being etched and forming the gate, the photosensitive film (PR2) pattern is removed.

Technical Problems to be solved by the Invention

But there is a problem that the manufacturing method of the conventional semiconductor device as described above is difficult that it is difficult to the control of the bird - beak (bird's beak) length and it controls the size of the active area as the photo lithography for the formation of the field oxide film is separately progressed. The loss of the time and manufacturing cost breaks out as the oxidation process of the long time for the formation of the field oxide film is required.

The present invention is to provide the manufacturing method of the semiconductor device which originates in order to solve the conventional problem as described above, and at the same time, it defines the isolating area between elements through the photo lithography for the gate forming and the object of the present invention minimizes the changing of characteristic factor of device and processing simplification, and in that way can secure the characteristic of being stable of device.

The Structure and Function of the Invention(Device)

The manufacturing method of the semiconductor device for achieving the purpose of the present invention as described above is characterized that the process of injecting the impurity ion for the threshold voltage control, the process it successively forms the gate oxidation film and polysilicon after removing the buffer oxide layer, and coating the poly silicon upper part with the first photoresist, and of exposing and developing and taking shape the first photoresist pattern so that the polysilicon of the domain, the process applying the first photoresist pattern and etching polysilicon and gate oxidation film, and of removing the first photoresist pattern after it etches excessively in order to be the and then exposed semiconductor substrate etched to the predetermined depth and forming the shallow trench, the process it performs the field oxide after performing the high voltage source / drain ion injection to the exposed domain of the semiconductor substrate, and the process coating with the second photosensitive film on outcome, and etching the polysilicon are included after forming the buffer oxide layer on the semiconductor substrate upper and it is made. As to the process it successively forms the gate oxidation film and polysilicon after, the isolating area between elements is formed be exposed. As to the process it performs the field oxide after, the shallow trench as described above is formed and of forming the field oxide film. The process coating with the second photosensitive film on outcome, and etching the polysilicon is exposed after it exposes and it develops and it takes shape the second photosensitive pattern so that the gate forming area polysilicon be exposed and forming the gate, and of removing the second photosensitive pattern.

It has the procedure side view of the figs. 2a through 2f attaching the manufacturing method of the semiconductor device by the present invention as described above as the embodiment and as described in detail, it is the same as that of the next time.

Firstly, as shown in Figure 2a, after forming the buffer oxide layer (12) at the upper part of the semiconductor substrate (11) in which the N-well / P-well (non illustration) is formed through the process of being normal, the impurity ion for the threshold voltage control is injected.

And as shown in Figure 2b, the buffer oxide layer (12) is removed. The photosensitive film (PR11) is coated with at the upper part of the polysilicon (14) after successively forming the gate oxidation film (13) and polysilicon (14) at the upper part of the semiconductor substrate (11). It exposes and it develops and the photosensitive film (PR11) pattern is taken shape so that the polysilicon (14) of the domain in which the isolating area between elements is formed be exposed.

And as shown in Figure 2c, the polysilicon (14) and the gate oxidation film (13) exposed by the photosensitive film (PR11) pattern successively are etched. After in order to it is the and then exposed semiconductor substrate (11) etched to the depth of about 500 Å etching excessively and forming the shallow trench, the photosensitive film (PR11) pattern is removed. The high voltage source / drain ion injection is given effect to.

And as shown in Figure 2d, the field oxide is performed on outcome and the field oxide film (15) is formed on domain in which the high voltage source / drain ion injection is performed. At this time, the oxide film (non illustration) is grown up on the polysilicon (14) due to the field oxide. However, it ins comparison with the field oxide film (15) which is grown up through domain in which the semiconductor substrate (11) is damaged due to the high voltage source / drain ion injection and it is minute. And the field oxide film (15) which has enough isolation while shortening the field oxide time through the damaged domain of the semiconductor substrate (11) even though it considers the small polysilicon (14) loss of amount is formed. According to use the moreover shallow trench, the bird - beak length of the field oxide film (15) is minimized.

And as shown in Figure 2e, the photosensitive film (PR12) is coated with on outcome. The polysilicon (14) which is exposed after exposing and developing and taking shape the photosensitive film (PR12) pattern so that the gate forming area the polysilicon (14) be exposed is performed a wet etching.

And as shown in Figure 2f, the photosensitive film (PR12) pattern is removed.

Effect of Invention(Device)

The manufacturing method of the semiconductor device by the present invention as described above has the effect that the loss of the time and manufacturing cost can be minimized through the processing simplification according to the shallow trench be formed through the photo lithography for the gate forming and at the same time, define the isolating area between elements. And the bird - beak length is minimized and the size and process margin of the active area are secured. In that way the changing of characteristic factor of device is minimized and the stable device character can be secured.

Scope of Claim(s)

Claim [1]

A manufacturing method of the semiconductor device comprising the steps of: after removing the process of injecting the impurity ion for the threshold voltage control after forming the buffer oxide layer on the semiconductor substrate upper and buffer oxide layer, successively forming the gate oxidation film and polysilicon; coating poly silicon upper part with the first photoresist; applying the process of exposing and developing and taking shape the first photoresist pattern so that the polysilicon of the domain in which isolating area between elements are formed be exposed and the first photoresist pattern and etching polysilicon and gate oxidation film; the second photosensitive film is coated the and then with on the process, of removing the first photoresist pattern after it etches excessively in order to be the exposed semiconductor substrate etched to the predetermined depth and forming the shallow trench the process it performs the field oxide after performing the high voltage source / drain ion injection to the exposed domain of the semiconductor substrate in which the shallow trench as described above is formed and of forming the field oxide film and outcome; etching the polysilicon which is exposed after exposes and develops and takes shape the second photosensitive pattern so that the gate forming area polysilicon be exposed and forming the gate; and including the process of removing the second photosensitive pattern and being made.

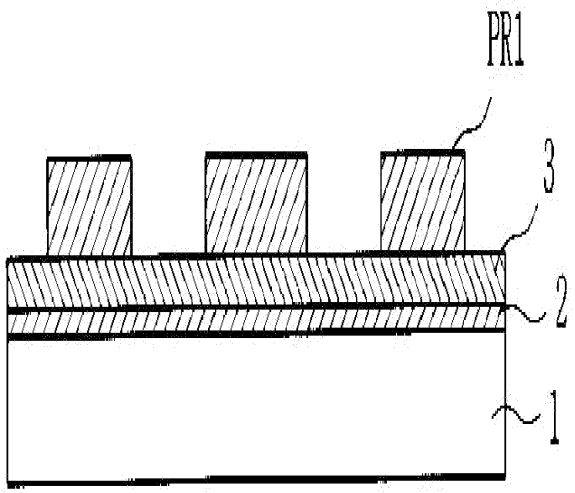
Claim [2]

The manufacturing method of the semiconductor device of claim 1, wherein the shallow trench as described above forms into the depth of about 500Å.

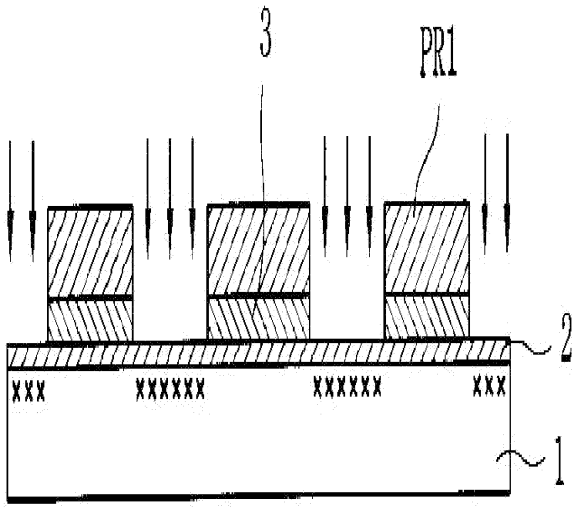
Drawing

Drawing(s)

Drawing 1



Drawing 2



Drawing 3